Gas Journal

VOL. 301 | 112th YEAR | LONDON, MARCH 2, 1960 | No. 5035 | PRICE 1/6

DRAKES OF HALIFAX LIMITED

THE UNIVERSITY OF MICHIGAN
MAR 21 1960
ENGINEERING LIBRARY

by arrangement with

SCHMIDT'SCHE HEISSDAMPF GESELLSCHAFT m.b.H.

(GERMANY)

can now offer double tube Waste Heat Boilers, or fired by either oil, gas, solid fuel, (including waste wood or sawdust), aiso variable pitch hot Gas Propeller Fans, adjustable in operation.

1847 D 1960

See Our

STAND No. 18

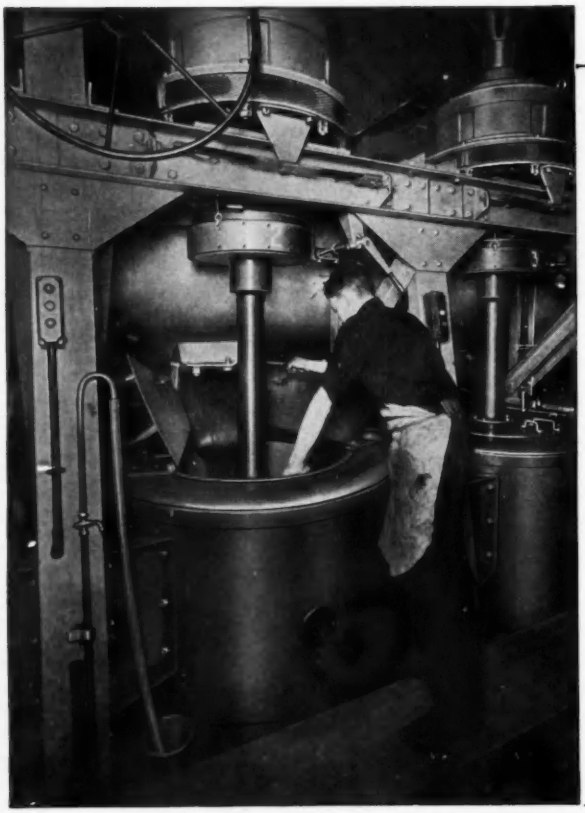
ROW "F"

"FUEL EFFICIENCY & POWER FOR INDUSTRY EXHIBITION" at OLYMPIA April 27th—May 6th, 1960

Telephone:
HALIFAX 4701 P.B. Ex.
Telegrams:
DRAKETED TELEX HALIFAX
TELEX No. 51192

CONSTRUCTIONAL GAS ENGINEERS FOR MORE THAN A CENTURY

J.J.M.



BROADBENT

HIGH SPEED

CENTRIFUGALS

STANDARD TYPE MACHINES
DRIVEN BY
DIRECT COUPLED MOTOR
OR
SEPARATE MOTOR
WITH
BOTTOM DISCHARGE
BASKETS
FABRICATED FROM
MILD STEEL, STAINLESS STEEL
MONEL, COPPER, ETC.

80 Years' Reputation for Reliability

THOMAS BROADBENT & SONS, LTD.
HUDDERSFIELD
DISTRICT OFFICES AT
LONDON · BRISTOL · LEICESTER · MANCHESTER · NEWCASTLE

THE *Linton* HIGH PRESSURE GAS SERVICE REGULATOR

This regulator is mass produced in a number of different types to suit individual requirements utilising generally the same main components.

The regulator is primarily used for controlling the gas supply from high pressure mains to domestic premises, and is usually fitted with an internal valve safe-guarding the meter.

The 'R' Type can be supplied to suit inlet pressures up to 100 p.s.i.

The 'BR' Type is suitable for inlet pressures up to 150 p.s.i.

The 'BR' Type can be supplied where the inlet alternates between high and low pressure.

FULL DETAILS ARE GIVEN IN OUR PUBLICATION G/81.

THE BRYAN DONKIN CO. LTD.

Chesterfield Tele :— 3153. London Tele :— ABBEY 1036.

Gas Journal

VOLUME 301 • NUMBER 5035 • 112TH YEAR

WEDNESDAY, MARCH 2, 1960

CONTENTS

EDITORIAL COMMENT

Refinery Gases—A Story of Achievement - - 353

Target for Tomorrow - - - - - - - 354

SPECIAL ARTICLES

Gas Looks Ahead. By R. Kelf-Cohen - - - 355

Dig This, Mr. Therm. By F. Teskey-King - - 363

NEWS SUPPLEMENT

Gas Council Chief Confirms Trend - - - 369

Kidderminster Works Maintains Pressure in Floods - 369

British Plant Ordered in Fuel Expansion Plan for Mexico - - - - - - - - - - 370

'Gas Journal' C. & D. Alterations - - - - 370

Personal Notes - - - - - - - - - 371

Diary - - - - - - - - - - - 371

TECHNICAL RECORD

The Treatment of Refinery Gas for a Commercial Outlet. By I. F. S. Robinson and P. R. Johnson 357

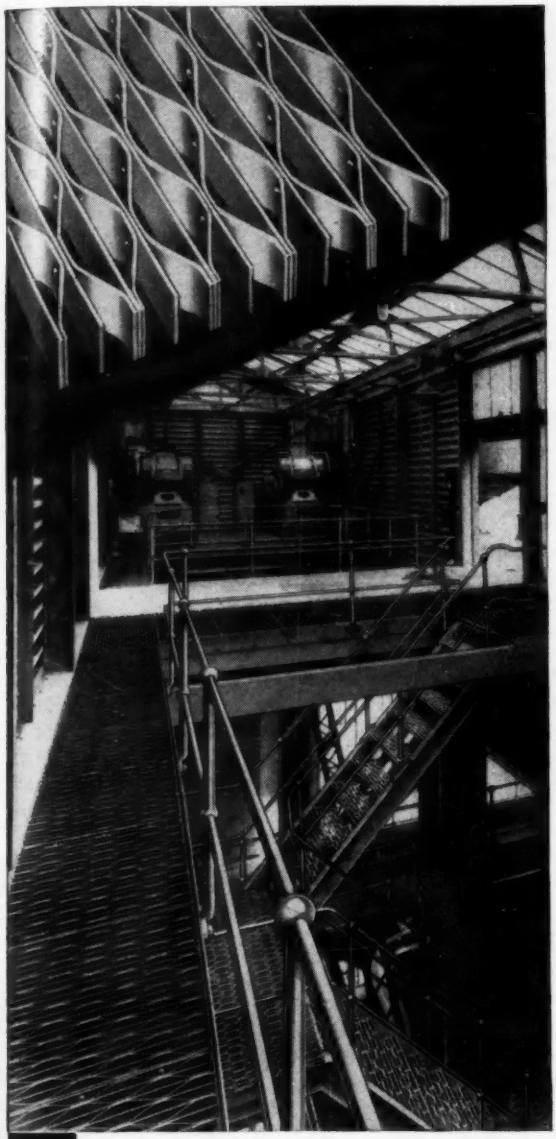
Gas on the Continent - - - - - - - 362

GAS IN INDUSTRY SUPPLEMENT

Editorial Comment: Gas in Modern Industry - - 65

Gas at Work in Industry Exhibition. Review by Eric Ford - - - - - - - - - 66

Cremation. A Resumé of Progress. By A. Higgs - 80



OPEN TYPE FLOORING
WALKWAYS
STAIRWAYS
PLATFORMS
HANDRAILS

Consult...

STEELWAY LIMITED
WOLVERHAMPTON

QUEENSGATE WORKS, WOLVERHAMPTON
Phone: 21633 (2 lines)

LONDON Office: 25 Hanover Square, London W.1
Phone: Mayfair 8783-8788

GLASGOW Office: 74 York Street, C2.
Phone: Central 3467.

Editor:
GEOFFREY W. BATTISON

Assistant Editor:
COLIN J. GODBOLD

Technical Editor:
CHARLES J. P. DE WINTON,
T.D., M.A., M.Inst.Gas E., M.Inst.F.

PUBLISHERS' NOTICE, SEE PAGE 251, FEBRUARY 10, 1960

PARKINSON COWAN

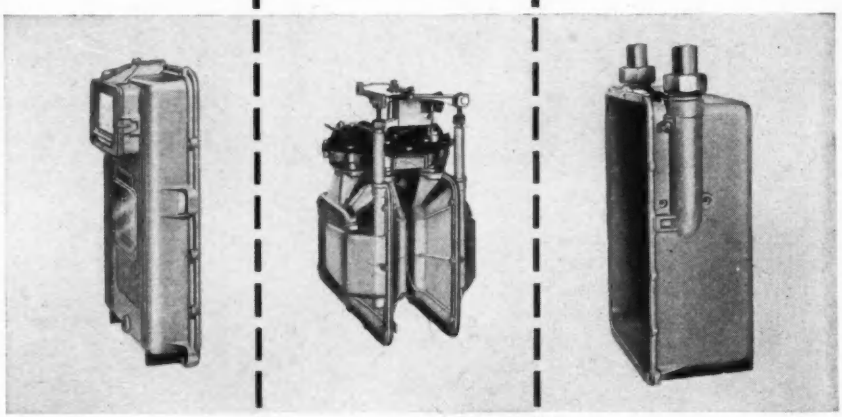
LEADERS BY DESIGN...

Parkinson Cowan lead in the UNIT CONSTRUCTION of domestic gas meters. UNIT CONSTRUCTION is more than good engineering design. Its purpose is to ensure maximum economy in gas meter maintenance. Zephyr and Flomaster meters have two-part cases. They can be rapidly dismantled to give immediate access to the unit-constructed mechanism. This time- and labour-saving feature represents a considerable economy throughout the life of the meter.

PARKINSON COWAN ZEPHYR '219' METER (STEEL CASE)

Specify UNIT CONSTRUCTION

BEGWACO FLOMASTER METER (DIE-CAST ALUMINIUM CASE)



Products of the PARKINSON COWAN GROUP

Terminal House, 52 Grosvenor Gardens, London, S.W.1
Tel: SLOane 0111 Telegrams: DISC, London

Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Refinery gases—a story of achievement

THE increasing use of refinery tail gases by the gas industry is an indication of the growth in the tendency to use any available source of raw fuel for the manufacture of town gas. Such a development will necessarily widen the outlook of the gas boards and increase the gas engineer's interest in oil refinery techniques, at the same time giving him an insight into a very large field of chemical engineering.

The industry's greater interest in instrumentation and automatic control in the last few years has almost certainly sprung from its use of oil and refinery gases for gas making and its contacts with refinery practice. It is notable, however, that although refinery gases have been available for a number of years, it is comparatively recently that the gas industry has made any use of them on a large scale.

Perhaps to some gas engineers the purchase of refinery gas might appear as a somewhat simple undertaking, by which the industry is prepared to accept any superfluous gas the refinery may have available, neatly stored and ready to hand; in fact a set-up similar to a coke oven plant at which conventional gasholders with a capacity of some 250,000 to 500,000 cu.ft. store the gas for the respective gas board. To be convinced that this is not so, it is only necessary to read the paper we are publishing this week on the production and supply of refinery gas for the gas industry by Mr. I. F. S. Robinson and Mr. P. R. Johnson, of the Esso Petroleum Co. Ltd. They describe the arrangements made at the company's refinery at Fawley for the supply of refinery gas to the Southern Board's gasworks at Southampton.

The lack of any form of gas storage at the refinery, other than the internal gas mains, might seem strange at first sight, but it must be remembered that the throughput of oil at a refinery is far greater than the coal at any British gasworks and that consequently the volumes of gas to be stored would make the building of sufficient storage uneconomic.

Instead a system has been devised by which gaseous by-products from several sections of the refinery are collected into a refinery gas main at a pressure of 45 p.s.i. and distributed to the various consumers which are in different sections of the refinery itself as well as to the Gas Board.

Clearly very careful safety arrangements must be made to avoid a change of pressure taking place in this refinery main. An excess pressure is neutralised by opening a safety valve and bringing a flare into operation; any reduction in pressure is compensated by the evaporation of propane into the main.

The use of propane seems particularly appropriate, since it vaporises easily and at the same time does not cause any condensation in the refinery distribution system.

In actual practice these two safety devices are made use of as little as possible in order to avoid loss of gas by flaring—now a valuable commodity to be purchased by the Gas Board—and a direct wastage of propane—a valuable product of the refinery itself.

By keeping a careful balance on the volumes of gas consumed, this particular aim has been attained. But as the activities at the refinery have increased and more plant has been added, so the reaction to the change in demand at any one point has become too slow to neutralise changes in this refinery gas main and certain modifications have had to be made by which the pressure is allowed to vary between 44 and 46 p.s.i.

Before refinery gas could be supplied to the Board certain conditions of quality had to be laid down—a minimum calorific value and a maximum sulphur content. These limits amounted to a minimum average calorific value per calendar month of 870 B.t.u. per cu.ft. but never below 800 B.t.u. per cu.ft. at any one time and a maximum hydrogen sulphide content of 2% by volume. At the same time the oxygen content of the gas was not to exceed 4%.

The refinery undertakes the extraction of inorganic sulphur from the gas by washing it with di-ethanolamine (D.E.A.) solution, which is regenerated by boiling and the hydrogen sulphide made available is burnt under special conditions to produce high grade sulphur. The efficiency of sulphur extraction depends on the degree of recycling of the D.E.A. and the hydrogen sulphide content of purified gas can be as low as .5% in a clean plant, but rises as the plant becomes fouled.

These were the sort of problems which had to be solved by the oil company before a regular supply of refinery gas could become a reality, and it appears to us as something of an achievement on the part of the gas industry that the oil companies should have been

prepared to meet these conditions, since it must have of necessity involved them in spending a certain amount of money. In the past the flare—often several of them—seemed to be an integral part of the refinery landscape and many outside the fuel industries might well have judged the degree of the refineries' activity from their number. In the past the main source of heat for the refinery processes was supplied by refinery gases which could be, of course, burnt without further purification, but we understand that residues of high viscosity and of no other commercial value, are being used as a refinery fuel, and this has contributed to the release of refinery gas to the industry.

We feel, however, that perhaps the oil industry may not have realised the potential worth of these tail gases until the area boards, driven by rising coal prices, decided to negotiate for a possible supply. The converse may even be the explanation as to why earlier use was not made of them, namely, that increasing demands on British refineries had raised their throughputs to such an extent, that the finding of an outlet for the refinery gases was forced upon the oil companies.

A third reason may have been that suitable reforming plant may not have been available until comparatively recently, to cope with the large volumes of gases now being purchased. Their supply on a large scale is now, however, an accomplished fact and may even increase, should more refineries be built in Britain.

Target for tomorrow

THE Gas Council's forecast of the industry's progress by 1965-66 may be examined from a number of different viewpoints. Certainly their new booklet, *Gas Looks Ahead*, has much to commend it. It is factual, written in a spare, down-to-earth manner, and makes no attempt to blind its readers either by science or gloss. Moreover, its publication is timely, both from the financial angle and from that of propaganda. Although far from silent, the gas industry has less to say about itself than, for instance, the coal industry, perhaps because it is to a much smaller degree a bone of political contention. Although, with coal, a nationalised industry, it has been astute enough—and lucky enough—to be able to keep on the fringe of violent political debate, moving effectively into the limelight every now and again when it has reason to take a bow. There are times, however, when the industry must put its cards on the table and tell the country what it is doing and where it is going. This is one of them, and *Gas Looks Ahead* makes a good job of it.

The booklet points out that capital requirement of the gas industry is likely to be £370 mill. for the seven years under review. Expansion plans for the period will entail net new borrowing of £114 mill. after taking into account depreciation and other internal resources amounting to £256 mill. It is shown that borrowing during the ten years ending March, 1959, came to £324 mill. or expressed as a percentage of capital investment, 70%. But in the period April, 1959, to March 31, 1966, it will only be 32%. A Government Gas Bill, published a fortnight ago, raised total borrowing limits by £50 mill, and by subsequent order of the Minister of Power, Mr. Richard Wood, to £525 mill.

This must be considered in relation to the anticipated rise in the demand for gas—9% during the seven years which began on April 1, 1959. It is estimated that sales of gas will have increased to 2,839 mill. therms in the year 1965-66 from 2,605 mill. therms in 1958-59 and 2,328 mill. therms in 1949-50. Domestic sales are expected to increase by 3.6%, industrial sales by 19.9% and commercial and other sales by 7.8%.

The estimate is regarded in some quarters as being optimistic, perhaps unduly so. Mr. Kelf-Cohen, whose review of the booklet is on the facing page, views the situation with an economist's eye and an almost unique understanding of the nationalised industries. If he is critical it is a criticism based on knowledge rather than prejudice.

Whether the Gas Council have indeed been optimistic in their estimates it is difficult to say. The fuel situation as a whole is changing so rapidly that it is very difficult indeed to assess the effects of the modernisation of the mines, nuclear energy, and the growing dependence on oil in six years' time. Technical development in the various fuel industries is proceeding in different ways and at different speeds. Fuel consumption behaviour is changing, influenced by politics, by price fluctuations, by degrees of service offered by the various fuels, by legislation, and even by fashion.

Of one thing, however, there can be no doubt—the estimated increase in sales is extremely small. Indeed, assuming as we must that the figures given are based on a fairly vigorous commercial policy the impression given is that we shall be pedalling hard in order to do little more than stand still.

This is not a prospect likely to appeal to young technologists or salesmen seeking an attractive outlet for their endeavours. What salesman's heart would rejoice at the prospect of a target based on increasing sales by less than 4% in seven years?

After all, so many things could happen. Some check on oil imports would immediately change the situation; so might an alliance between a rejuvenated coal industry and a gas industry dedicated to a policy of total gasification and using imported methane as a balancing factor; and on the domestic front a wide acceptance of gas as the fuel for home heating could have a profound effect on sales.

We have on many occasions affirmed our belief in the future of gas as a fuel in this country. It appears to us entirely logical that this convenient, piped fuel, manufactured from an indigenous mineral, should have an important part to play in British good housekeeping for many years to come. But equally we have insisted that if gas is to be increasingly welcomed into British homes the public's conception of it must be changed. This would necessitate a formidable job of market research, motivation and advertising, and would cost a great deal of money. What is interesting about all this is that investment in a programme designed to change the brand image of gas might well be a safer investment than a Lurgi plant or half a dozen tankers.

GAS LOOKS AHEAD

—but is it looking through rose-tinted spectacles? A suggestion that the Gas Council may be a little over-optimistic is made in this review of their recently published blue print for the next six years by

R. KELF-COHEN, C.B.

'GAS Looks Ahead' is the Gas Council's plan for developing the gas industry during the seven year period ending March 31, 1966. In reviewing this document, a commentator is at a disadvantage in not having any useful statistics for the year 1959-60. The Gas Council must be presumed to have statistics for at least 9 months of that year and to be aware therefore of the trends during the first year of the period covered by the plan.

The keynote of this document is pitched considerably lower than that of its glossy predecessor 'Fuel for the Nation' issued by the Gas Council in May, 1954. The earlier plan started with the postulate (p. 9) that there was a 'Constantly increasing demand for gas' and accordingly envisaged a substantial increase in daily gas making capacity from 11.19 to 12.79 mill. therms —an increase of 1.6 mill. therms. In fact capacity only increased to 12 mill. therms in the period up to March 31, 1959, and the new plan envisages a further net increase of .4 mill. therms up to March 31, 1966. In other words the gas industry will have a daily capacity of .4 mill. therms less six years after the end of the period covered by 'Fuel for the Nation.' That is the measure of the realism which now informs the industry.

Nevertheless this net addition of 400,000 therms a day will cost £117 mill. during the seven years, because 2.2 mill. therms of new capacity will be built and 1.8 mill. therms of old plant will be closed down. Of the 9.7 mill. therms with which the industry started on vesting day, 5.1 mill. will have been closed down 17 years later.

By March, 1966, five of the boards will have less capacity than today, seven will have more. The following table shows how the change in productive capacity will take place for each board:—

Capacity at March 31, 1966, compared with March 31, 1959.

	Thousand therms
Scotland	− 50
Northern	+ 60
N. Western	− 65
N. Eastern	− 60
E. Midlands	+130
W. Midlands	+150
Wales	+ 30
Eastern	+ 25
N. Thames	− 85
S. Eastern	+275
Southern	+ 5
S. Western	− 10

During the first ten years of nationalisation the net increase in daily capacity was 2.3 mill. therms from 9.7 to 12 mill.—an increase of 24%. During the same period sales of gas increased from 2,328 to 2,605 mill. therms—an increase of 12%. But half of that increase 'has been met by greater purchases of gas from coke ovens and more recently from oil refineries; the remainder by increased production at the boards' own works, (para. 12). At the same time the 'overall thermal efficiency of production rose from a figure of 72% in 1948 to 77.7% in 1958-59, (para. 15). Today therefore the industry has oodles of productive capacity and further increases require the strictest economic justification.

What of the future demand for gas? The Gas Council estimates sales of gas will increase by 9% during the seven years of the plan, from 2,605 to 2,839 mill. therms per annum. Of this increase of 234 mill. therms, 146 will come from industrial sales, only 47 mill. from domestic, and 46 from commercial sales. The Council extrapolates the 30% increase in industrial sales over the last ten years and concludes the same increase will hold good over the next seven years. We shall know in the next year or two whether they are right.

Industrial sales trend

During the current year 1959-60, industry has been booming and it will be interesting to see whether the decline in sales of industrial gas in 1958-59 has been reversed and the onward march resumed. The great improvement in the steel and metal using industries during 1959 should have resulted in higher purchases of industrial gas—unless there has been a further swing to oil.

No reason is given for the estimate of the modest increase in domestic sales of gas. Since 1954-55, such sales have declined steadily year by year. As was pointed out in an article in the 'GAS JOURNAL' on November 11 last year, none of the 12 boards have escaped the tendency of the domestic consumer to take less and less gas, though the fall is greater with some boards than with others. The increase in the number of domestic consumers is more than offset by the decline in offtake per consumer.

In view of the reliance on increasing sales of industrial gas it is natural to expect a further increase in manu-

facturing capacity of the boards with large sales of industrial gas, such as the East and West Midlands. It is somewhat surprising, however, to find from the table above that the largest increase in capacity will be made by the South Eastern Board whose sales of industrial gas are less than 14%.

During the nine years between 1950 and 1959 their total sales of gas increased by only 3% while their capacity increased by over 10%. A further increase approaching 20% requires substantial justification which presumably is to be found in outworn high cost plant requiring replacement. But £22 mill. additional expenditure on manufacturing plant will add a heavy burden to the capital charges per therm which in the case of this Board are higher than the national average of 4.4 pence.

Crux of the plan

That brings us to the crux of the new plan. Can the industry afford during the next seven years to incur a further capital expenditure of £352 mill.? Even if much of this sum is found from internal resources and not from outside borrowing, it still has to be found from the sales of gas and products. At present it is imperative that prices of both remain static. It is to be hoped that the price of coal will remain steady. But other costs are going up—e.g., labour—and in the short run, at any rate, it is not easy to absorb such increases. The great technical developments on which the future of the industry depends, such as Westfield, Coleshill, Partington and the Isle of Grain, must go on with all possible speed. The Council admit that they do not know whether these developments will in fact be economic; in para 37 of their plan they are careful to say that 'the developments discussed in the foregoing paragraphs, if they fulfil their promise, would point to a new pattern of gas supplies'. But we are not yet in the Promised Land, and until we are there, the most scrupulous care should be taken not to incur capital expenditure which though technically desirable in itself does not yield a handsome return.

With the present level of gas sales and the present level of production and distribution capacity, it is hard to find justification for further capital expenditure which will raise the capital burden per therm of gas sold to 5.53 pence which is more than a quarter of the average price in 1959 of 20.92 pence per therm.

Not realistic enough

We may conclude therefore that the plan embodied in 'Gas Looks Ahead' is realistic but not realistic enough in the present state of the industry. There is too much of a tendency in certain circles to discount in advance the future benefits of technical developments which on the Gas Council's own statement have not yet proved their economic value. There are too many statements about a 'one-fuel industry' when carbonising produces two thirds of the gas available and even in 1966 will still produce 55%. The sale of products still 'provide one quarter of the industry's total gross revenue, by far the largest contribution being made by coke' (para 16). The capital being borrowed by the industry will be repayable over 25 years, and premature scrapping of the £376 mill. of fixed assets provided since vesting day and still outstanding is too costly to contemplate. During the 1960's these assets must provide the main capital structure for the industry's operations.

Incidentally, 'Gas Looks Ahead' makes only one reference to the importation of liquid methane and contains no proposals for developing the project. There is included, however, in the proposed capital expenditure during the seven years a sum of £25 mill. for possible modifications. We can assume that this will provide for the liquid methane project if it is approved by the Government.

'Gas Looks Ahead' is useful therefore as a blue print for the next six years. It is to be hoped that there will be a definite upturn in the sales of gas in the next year or two. If there is not, then much of the capital investment envisaged in the plan may become unjustifiable. For the next year or two, therefore, caution in capital spending is imperative.

Instrument Manual

THE third edition of the Instrument Manual, published recently, contains comprehensive descriptions of instruments and instrument systems used by industry and science.

Since the second edition appeared in 1953, certain changes have taken place in the make-up of this publication, among which are that the number of sections have been increased from 25 to 28, navigational instruments have been omitted and analogue computers have taken their place. Other changes to be seen in the new edition are the rearrangement of the section on optical instruments, and a section given over to smoke density measurement. Microscopy now has a section to itself and the analytical pattern of optical instruments has been included in the section under analytical instruments generally.

Since the second edition, too, automation has burst upon the world of technology and has caused much rethinking on the part of industry as to the rôle instrumentation and centralised process control should play. The term 'automation,' is however, generally considered unsatisfactory and disliked by scientists, but as is pointed out in the introduction, it does, in fact, describe a field of operation in which instrumentation does play a leading part. It was with some difficulty that a decision was come to as to the heading under which computers should be included. Eventually since so much of the information available is in such a fluid state and might be obsolete on publication, a section, as observed earlier, was devoted to analogue computers and any reference to digital computers omitted.

The present edition is under the general editorship of Mr. J. T. Miller, and 15 of the sections have been contributed by specialists in their particular fields. It is extremely well illustrated by line-drawings and, where appropriate, half-tone reproductions. At the end of each section is included a bibliography and a buyer's guide, so it has an interest for the scientist, the instrument engineer and the buying department.

Priced at five guineas, it is published by the United Trade Press Ltd., of 9, Gough Square, E.C.4.

From a paper to the London and Southern Section of the I.G.E.

The treatment of refinery gas for a commercial outlet

By I. F. S. ROBINSON and P. R. JOHNSON,
ESSO PETROLEUM CO. LTD., FAWLEY.

AN oil refinery, in common with any other producer, always attempts to maximise production of the most profitable commodity. In crude oil, there are many different potential products, and, within limits, it is possible to vary the production pattern to meet this requirement. The extent to which this can be done depends on various factors—the crude oil itself, the processes and equipment available, and, of course, the efficiency of any process. In addition to the amount of gas in the crude oil as received, and this varies with the type of crude, any subsequent treatment also results in the conversion of a small percentage of the oil into gas. The volume of oil processed per day is very large, so that even a small percentage of gas represents quite a large quantity.

Until recently, this gas has been an unsold by-product, used entirely as a refinery fuel. In this service, it accounts for a considerable part of the refinery heat load. Over the past two years, the picture has changed, and gas has become a product with a commercial outlet. The paper by Thorne, Harrison and Fairman* shows how important this gas has become to the Southern Gas Board, and also shows that the potential value to the gas industry is very great.

The contract exposed us to some new experiences at Fawley refinery. One of the most important was that for the first time we were selling to a customer through the direct link of a pipe-line. This meant that the fine balances of operation, both at the refinery and at the gasworks, were to some extent inter-dependent. Refinery operation in relation to our products, other than gas, is based on a storage capacity of several days. For gas, however, we have no storage other than the capacity of our internal gas-line network. On full refinery load, this capacity is only of the order of five minutes consumption.

Apart from the overall problem of establishing a satisfactory production pattern, there have been some difficulties with the installation for supplying the gas. These have included metering accuracy, freezing up of valves, and maintenance of supply within the quality limits. This paper described these problems from the refinery point of view, and what steps have been taken to eliminate them.

The paper referred to above described the main gas producers at Fawley refinery, and quotes typical analyses of the gas streams. These are listed in Table 1.

In order to appreciate the problems that can occur when supplying gas to an outside consumer, it is necessary to explain in more detail the internal refinery gas system as shown in Fig. 1. If this is examined with the eye of a gas engineer, there is the obvious deficiency of a gasholder. It is easy to see that the addition of some form of gas storage would be a considerable asset, but the give and

* 'Experience with Refinery Gas at Southampton.' I.G.E. Comm. No. 536. 1958.

TABLE 1.

	Source						
		Chemical Plants					
	Hydroformer vol. %	Ethylene recovery, vol. %	Dehydro vol. %	Cat. Cracker vol. %	Polyplant vol. %	Hydrofiner vol. %	Powerformer vol. %
H_2O	—	—	·5	—	—	—	—
H_2S	·5	—	—	8	—	3·5	·5
Inerts	3	—	7·5	17	—	2·5	—
CO	—	—	3	—	—	—	—
H_2	55·5	30·5	79·5	15	—	52	54
CH_4	16	51·5	2	21	—	17·5	19·5
C_2H_6	12	15·5	—	6·5	7	12·5	23
C_2H_4	—	1·5	1	11	·5	—	—
C_3H_8	8	1	4	17·5	35	8·5	2
C_4H_{10}	4	—	2·5	3	57	3·5	1
C_5+	1	—	—	1	·5	—	—
Sp. Gr.	·52	·50	·30	·92	1·82	·53	·44
C.V.	925	930	480	1,175	2,930	910	855

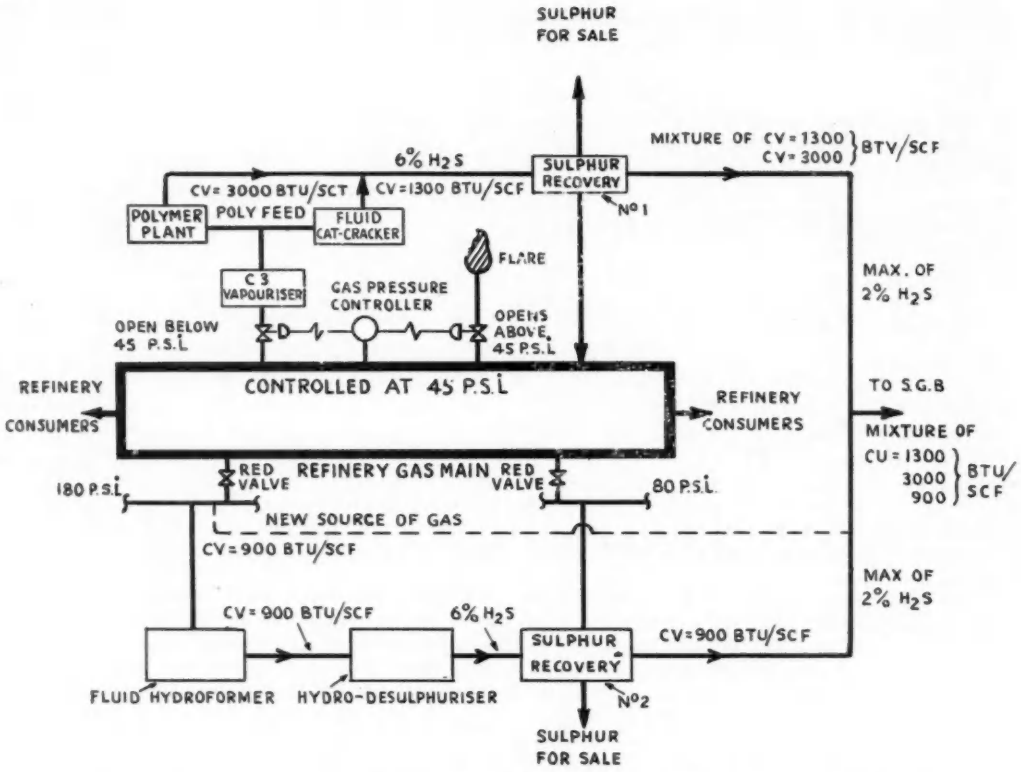


Fig. 1. Refinery gas system in relation to Southern Gas Board supply.

take of gas amounts to some tens of mill. of cu.ft. per day, which means a very large holder together with the necessary equipment for gas compression. The cost of such a scheme would be considerable, and there has never yet been sufficient financial incentive to go ahead with the idea.

The gas system was equipped with a safety valve in the form of a flare and a limited reserve capacity in the form of a pressure vessel, containing liquid feed consisting largely of propane. The pressure in the refinery gas main was maintained at 45 p.s.i. by a single pressure controller which operated two valves:—

1. The valve in the flare line which opened when the pressure rose above 45 p.s.i.
2. The valve in the line from the pressure vessel containing propane. This was coupled to the valve supplying steam to the steam coils in the vessel. Hence when the pressure fell below 45 p.s.i., steam was admitted to the coils and propane vaporised.

Propane for boosting

During normal operation, every effort was made to run with both of these valves closed. Any loss to flare represented a direct wastage of fuel, while drawoff from the propane vaporiser represented a direct loss of a valuable product. Propane was used for boosting the gas pressure because of the high vaporisation rate that could be achieved, and also because it did not lead to condensation problems in the refinery gas lines.

This system was adopted when the refinery was constructed in order to provide a steady fuel gas pressure without the necessity for a gasholder. Whatever system is adopted, it is true to say that a flare is essential, because in addition to its function as a fuel gas system pressure vent, it is also a safety valve, capable of taking the whole gas make of a major producer. This is necessary to provide for a unit breakdown.

It had been realised for some time that such a system was by no means ideal. As the refinery has expanded, so the gas lines capacity has increased. Because of the time lag inherent in a system of large capacity, it had become virtually impossible to control the pressure at 45 p.s.i. without one or other of the valves being open. To try to overcome this problem, we have recently installed a system (Fig. 2) which allows the gas pressure to fluctuate between 44 p.s.i. and 46 p.s.i., the variations occurring in this pressure range being absorbed at the steam plant.

One or two other points are also evident from Fig. 1. For instance, should the Southern Gas Board suddenly reduce their offtake by a large volume and more than

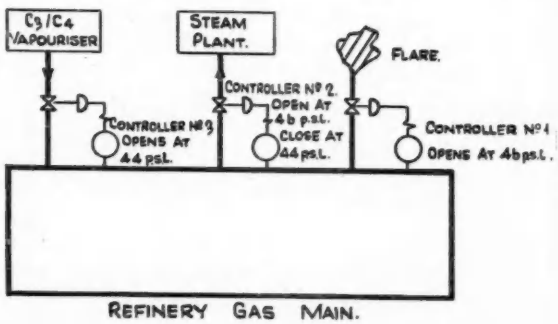

C_3/C_4 VAPOURISER
STEAM PLANT.
FLARE.
CONTROLLER No 2 OPEN AT 46 p.s.i. CLOSE AT 44 p.s.i.
CONTROLLER No 3 OPENS AT 44 p.s.i.
CONTROLLER No 1 OPENS AT 46 p.s.i.
REFINERY GAS MAIN.

Fig. 2 Experimental gas control system.

the steam plant would absorb, then the refinery gas main pressure would rise and gas would be flared. The only way in which this flare can be reduced is for refinery consumers to use more gas, and the switch-over from oil may take up to half an hour, depending on the particular circumstances. Conversely, should the Southern Gas Board require a large increase in gas over a short period of time, no matter how carefully the timing is arranged, there is only one way in which the gas can be readily available; it must be burning at the flare beforehand. In any sudden change in the volume offtake therefore, there may be wastage of gas at the flare for a short period.

Another important point is that a large and unexpected increase in the offtake—due, for instance, to the main becoming fractured—could be beyond the capacity of the propane vaporiser to maintain gas lines pressure. It was for this reason that a flow limit controller was included in the Southern Gas Board's offtake facilities. The function of this controller is to allow reasonable variation in flow, but at some predetermined level (which can be varied in relation to the general refinery situation) to restrict the flow to that upper limit.

It is possible, of course, for the gas pressure to fail because of an internal refinery upset. An extreme example would be a cat. cracker emergency shutdown. To allow for this sort of possibility, liquid fuels are used in the refinery at all times. No matter how much surplus gas is available under any given set of circumstances, a minimum amount of oil is fired to provide an emergency service. It is this factor which would set an upper limit on the refinery gas burning capacity. This limit is rarely reached. In general, we burn considerably more than the minimum oil in order to release gas for sale. This was recognised during the preliminary discussions with the Southern Gas Board.

There are two main types of fuel oil used in the refinery. Wherever possible, we use the very heavy residue as produced by the pipestills. This is an excellent low cost fuel but suffers from the disadvantage that it is solid at room temperatures, and in fact it must be heated to about 400°F. before it can be fired effectively. One way in which this is done is by using a recirculating system with a direct fired heater (Fig. 3). It will be seen from the diagram that it is essential that the oil should be kept moving. Some of the main pipes and laterals conveying the oil to the furnaces are electrically heated to prevent the oil solidifying.

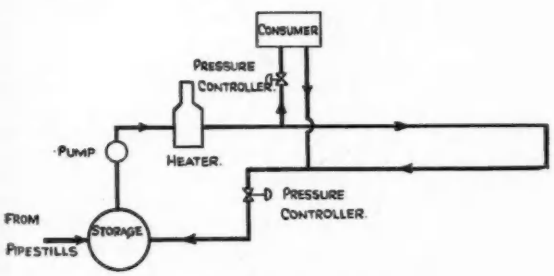


Fig. 3 Recirculating heavy fuel oil system.

It will be clear that there must be occasions when it just is not possible to keep the fuel moving. For example, even although the heater is never operating under severe conditions, there comes a time when it must be overhauled. The only way to take the heater out of service is to substitute a fuel oil that does not solidify and does not require constant recirculation. In the refinery we use blendstock—heavy fuel oil which is considerably lightened by the addition of middle distillate fractions such as the familiar gas oil. Blendstock is, of course, a much more expensive fuel and its use is minimised as far as possible.

Some 30% of the production comes from the catalytic cracking unit. The cat. cracker, as it is more usually called, is undoubtedly the hub of the refinery. On this unit depends not only a large part of the refinery gas make, but much more important to the refinery as a whole, a large part of the premium petrol production. The turn-around period requires very careful planning and is a major operation for the maintenance organisation. The timing of this period also needs very careful consideration.

Two main considerations

Petrol requirements vary with the season as do gas requirements, but unfortunately, the peak demands occur at different times of the year. The peak demand for petrol occurs during the summer months, and the cat. cracker turnaround is timed to suit this requirement. Two main considerations must be taken into account, the first being a tankage limitation. It would be impossible, on financial grounds, to instal enough tankage to be able to store sufficient petrol to meet this peak. The second consideration follows quite naturally that the cracker must be in peak operational condition during the summer. From this there can be no doubt that from the point of view of the refinery, the best time for the turnaround is February/March.

The gas industry is faced with exactly the same problem as we are—lack of long-term storage capacity. It is unfortunate that the peak demand for gas occurs at exactly the time when we are shutting down the cat. cracker, but this is a challenging problem. We are planning, however, by installing additions to the plant, to extend the time between turnarounds considerably.

The sales agreement quotes a restricted offtake of 9,500 therms per day when a major unit is on turnaround. Because we are alive to the problems of the gas industry, during the February, 1958, cat. cracker turnaround, we were able to supply considerably above the minimum by connecting an additional source of gas to the Southern Gas Board.

Broad quality limits

The gas quality as laid down in the sales agreement is only governed within broad limits. These are:

1. The minimum calorific value will not be less than 800 B.t.u. per cu.ft.
2. The minimum average calorific value per calendar month will not be less than 870 B.t.u. per cu.ft. except during periods of restricted supply.
3. The maximum hydrogen sulphide content will be 2% by volume.
4. The oxygen content will not exceed 4%.

In addition, there is a pressure restriction on the gas main, which is not to be subjected to a pressure of more than 30 p.s.i.

The current average calorific value of refinery gases is in the order of 1,200-1,300 B.t.u. per cu.ft., which corresponds roughly to that of cat. cracker gas. Referring to Fig. 1, it will be seen that the majority of this gas—apart from a small quantity of feed for the polymer plant—contains about 8% of hydrogen sulphide, and is fed direct to the sulphur recovery plant. At the sulphur plant, the hydrogen sulphide is removed by scrubbing with di-ethanolamine solution. After being scrubbed the gas can go direct to the refinery gas system or to the Southern Gas Board.

Di-ethanolamine solution (D.E.A.) can be regenerated

and the hydrogen sulphide—'acid gas'—is recovered. This is burned with a deficiency of air and elementary sulphur is produced for sale.

The D.E.A. solution provides an efficient means of removing hydrogen sulphide from the gas, and very low residuals of hydrogen sulphide can be obtained, provided that sufficient D.E.A. recycle is allowed. However, to scrub the gas to this extent imposed a restriction on the volume throughput of the unit, and it will be appreciated that although it is more efficient to scrub 100 volumes of gas from 6% to 0%, the sulphur recovery is greater if 200 volumes are scrubbed from 6% to 2%. Although the essential sulphur production can be met by scrubbing down to .5% when the plant is clean, this is by no means true after six months operation. As the unit becomes fouled, it is necessary to increase the sulphur level of the scrubbed gas, and we did find that the general level of hydrogen sulphide in the gas leaving the first sulphur plant tended to be higher than was originally anticipated for sale to the Southern Gas Board.

With this source of gas there is no danger of dropping below the lower limit of calorific value. Indeed it is just the reverse—most of the problems associated with calorific value are due to the rapid upswings that can and do occur. On occasions, in the past the calorific value has risen from 1,200 B.t.u. per cu.ft. to 2,000 B.t.u. per cu.ft. in a matter of two to three hours. This was not only a problem to the Southern Gas Board, but also to ourselves.

Problem overcome

The cause of these variations was well known. The cat. cracker, like the majority of refinery units, is a fully continuous unit. Another unit, the polymerisation plant, which produces a high octane petrol component, is not continuous. The unit has fixed bed reactors, the catalyst of which has to be replaced at regular intervals. Until August of this year, the plant had only two reactors. The effect, then, of taking a reactor off stream was that a part of the gas which would normally be fed to the unit was diverted to the gas system. This gas has a high calorific value—over 3,000 B.t.u. per cu.ft.—so the normal gas mixture received a considerable boost in calorific value. Recently, we have had three reactors so that this problem has been overcome.

Except during the 1958 cat. cracker turnaround, as has already been described, cat. cracker gases were the only source of supply for the Southern Gas Board until the second sulphur plant came on stream in May, 1958. The outlet gas from this unit has a much lower calorific value and a higher hydrogen content, which makes it much more desirable for the gas industry. This gas is basically hydroformer tail gas.

The hydroformer is a unit specifically designed for the production of high octane petrols. The basic reaction involved is that of dehydrogenation with the formation of unsaturated ring type compounds. The gases produced in this reaction have a hydrogen content of about 50%, and because the feed to the unit has a very low sulphur content, the hydrogen sulphide in the gas is negligible. These characteristics—high hydrogen content, low hydrogen sulphide content—make this gas very suitable for a further process called hydro-desulphurisation.

Hydro-desulphurisation (hydrofining for short) consists of treating certain types of product, such as gas oils and diesel oils, with hydrogen under pressure in the presence of a catalyst. Unwanted sulphur compounds in the oils are converted to hydrogen sulphide and thus removed. Instead of producing hydrogen specially for the process which can be very expensive, it has been found possible to use hydroformer gas as the treat gas. The tail gas from this process has virtually the same composition as when it left the hydroformer, with the difference that the hydrogen sulphide content is now over 3%. To ensure maximum economic use of this gas, it passes through a sulphur recovery process and is treated in exactly the same way as the cat. cracker gases. The gas leaving the sulphur plant has a calorific value of about 900 B.t.u. per cu.ft. and a hydrogen sulphide content of about 0.5%. This gas, however, is produced at 80 p.s.i. and a number of our units require gas at this pressure. Frequently very little of this gas is surplus. Recently the refinery has been supplying Southampton gasworks with a blend of the two gas streams.

To allow for a major upset outside our control, causing the Southern Gas Board's main to be fed with gas having a hydrogen sulphide content of greater than 2%, facilities are installed to enable the main to be pumped out from the Fawley end. This has never yet been necessary.

The specification relating to oxygen content has never been a problem. To date the oxygen content has not been greater than .5%.

It has been explained how sudden changes in the volume offtake of the Southern Gas Board immediately could involve the refinery in loss at the flame. To ensure that this loss is kept to a minimum a system of communications was established. At Fawley, one chemical engineer was appointed, as part of his duties, to act as the technical liaison officer and deal with all queries relating to the supply of gas to the Southern Gas Board. One of the first tasks was to write an operating manual which was agreed with the Southampton gasworks' personnel. In addition to operating problems, this engineer deals with the arrangements for volume changes which are known in advance, such as planned maintenance periods.

As an additional precaution, and when emergency action has to be taken at night, the shift supervisor at the refinery is informed approximately one hour before the change takes place. His office is manned at all times of the day and night and he is in a position to make the necessary immediate arrangements.

When alterations, such as an increase in calorific value, are known in advance, the Southampton gasworks are given prior warning. We feel that on the whole this close liaison has worked very well, and that major upsets have been avoided to a great extent.

Control valve freeze-up

One of the most troublesome features of the system during the winter of 1957-58 was the excessive formation of condensate and the consequent freezing up of control valves. The system was commissioned in June 1957 and the gas cooler was not installed until January 1958. During November and December 1957, a number of partial and complete stoppages were experienced. Reference to Fig. 4 will show where these occurred. As has already been explained, the hydrogen sulphide is removed by scrubbing with D.E.A. solution. From this wash tower, the gas passes through a knock-out pot, which is simply a vessel fitted with baffles designed to remove most of the liquid carry over in the gas. After the knock-out pot the gas passes through a pressure controller designed to maintain the back pressure on the sulphur recovery plant at a constant pressure of 65 p.s.i.

The gas is carried to the refinery boundary through an 8-in. steel main. About halfway along its length is located the flow limiting controller, together with a second pressure controller which reduces the pressure to 45 p.s.i. The cooling facilities, consisting of a five hairpin finned salt water cooler with its associated knockout pot, are located

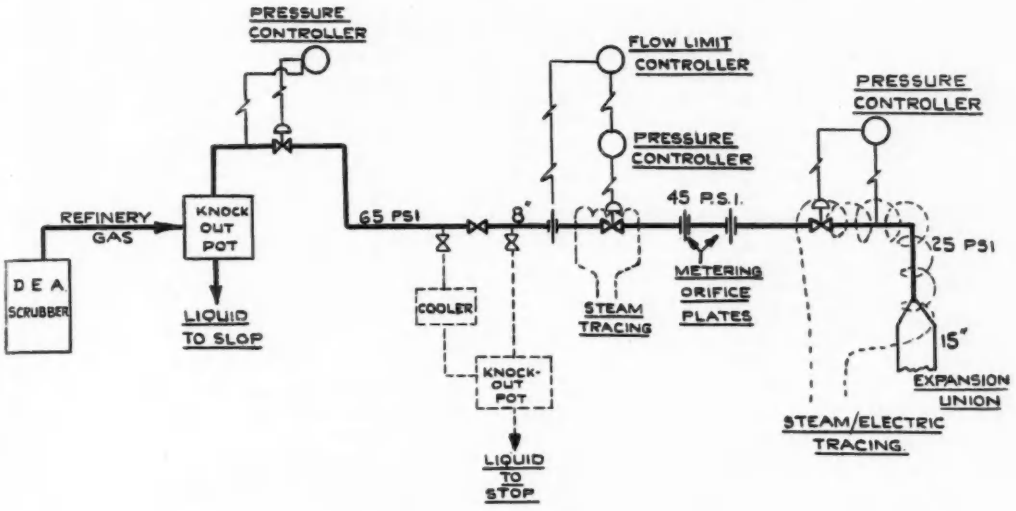


Fig. 4. Southern Gas Board supply facilities.

just before this second reducing valve. The cooler is fitted with a by-pass valve. After the reducing valve, the gas passes through the metering system which consists of twin orifice plates, each with two flow recorders. From the orifice meters, the gas passes through a third pressure control valve which reduces the pressure to between 10 and 30 p.s.i. depending on the current requirements. After this valve, the 8-in. steel main opens out into the 15-in. cast iron Southern Gas Board main.

It will be appreciated that the gas leaving the D.E.A. wash tower is virtually saturated with water vapour as well as containing some entrained liquid. The knock-out pot will remove entrained liquid, but of course will not remove water vapour in the gas. The gas cooler was included in the system to reduce the dew point of the gas to such a level that the water vapour is no longer a problem. During the period of operation before the cooler was completed, this water vapour was found to condense out in the system. In addition to the water vapour, the gas leaving the sulphur plant contains appreciable quantities of butane and heavier hydrocarbons which can also be expected to condense during cold weather. The possibility of condensate causing trouble was appreciated and quite elaborate arrangements were made for its disposal. The Southern Gas Board installed a number of condensate traps at intervals along the length of the main and purchased a special tanker, designed to carry hydrocarbons, for the collection of this condensate. The refinery agreed to accept the return of this condensate, allowing a credit for the hydrocarbon content.

Three vulnerable points

In practice it was found that the volume of liquid was by no means as great as had been expected. More important, all the liquid was recovered in the first two traps outside the refinery fence. This feature suggested that the condensable part of the gas was coming out very quickly, instead of the more gradual condensation that had been anticipated. As the weather became colder, it was clear that there were three vulnerable points in the system—the second and third reducing valves, and the joint where the 8-in. main expands into the 15-in. main. At various times, all three points suffered a partial or total freeze-up. The only ways in which the problem could be eased before the cooler came into operation was to run the outlet temperature of the sulphur unit as low as possible, thus reducing the water vapour content of the gas, and to instal steam or electric heating coils round the valves. This procedure certainly effected an improvement, although the situation was not satisfactory until the cooling facilities were installed. The pressure in the Southern Gas Board main was also increased to provide greater stored volume.

Metering installation

One other part of the system that gave rise to teething troubles was the metering installation. The complete metering installation consists of four flow recorders attached to two orifice plates, two Sigma calorific value recorders and one Sigma recording density meter. The three Sigma instruments are housed in a brick meter house at the refinery boundary, the meter house being temperature controlled and equipped with water supplies and a permanent Boys calorific value instrument. The calorific value is checked on the Boys at intervals not exceeding 48 hours. The Sigma meters were specially calibrated to fit the range covered by refinery gas. The flow recorders, following normal refinery practice, are housed in metal cabinets standing in the open. Two recorders are connected to each of the two orifice plates, each orifice having a recorder with a 10-in. range tube and a recorder with a 50-in. range tube. Normal flows require a 50-in. range tube while 10-in. gives better accuracy at low flow rates.

The calorific value recorders and the density recorder gave some trouble, but this was largely because of the special nature of these instruments. It was in the field of flow metering that the main discrepancy seemed to be. The gas is also measured at Southampton, in this case the instrument being of the positive displacement type. At the low flow rates experienced during the first two months of operation, there seemed to be no doubt that the Southampton metering system was the more accurate. Because of this, the refinery agreed during the first two months to waive the clause agreeing that the refinery metered figures should be taken as a basis for payment. As the volume offtake increased a point was reached where we felt that the flow records could be considered sufficiently accurate for a sales basis. In order to be sure of our ground at this

TABLE 2.
EFFECT OF VARIABLES ON METERING ACCURACY

Variable	Factors affecting variable	Affect of these factors	Estimated limits of error in volume measurement actually occurring	Suggested improvement	Estimated limits of error in volume measurement after improvement
Orifice diameter	Measurement accuracy	±0·1%	±0·2%	None	±0·2%
Orifice thermal expansion ..	Temperature	+0·01% per 10°F. Rise	Negligible	None	Negligible
Range tube	Measurement accuracy	±0·1%	±0·07%	None	±0·07%
Discharge coefficient ..	Pen position	Varies	−0·4% at Mid Scale	Use correction factor	Negligible
Gas expansion factor ..	Gas characteristics	−0·1% Max.	Nil	None	Nil
Gas compressibility factor ..	Gas characteristics	Varies	±0·1%	None	±0·1%
Upstream gas pressure ..	Accuracy of instrument and planimetering	±1% Max.	±0·5%	None	±0·5%
Upstream gas temperature ..	Accuracy of instrument and planimetering	±0·2% Max.	±0·1%	None	±0·1%
Gas density	Variation of meter house temperature	For rise in air temp. of 10°F. with gas temp. constant	−1·0%	Control air in meterhouse at constant temp.	Nil
Inherent accuracy of instrument	Maker's guarantee	±1% at Full Scale	±3·5% at 40,000 SCF/H	Wait until flow exceeds 63,000 SCF/H	Max. of ±2·0%

time, a detailed study was made of the possible errors involved. Table 2 shows the major items considered in this study. The table shows that the only items having an appreciable effect on the accuracy of metering are the inherent errors of the instrument in both flow and pressure measurement. At low flow rates, the overall error could theoretically be as high as 4%, but as the flow increases the error reduces. It is for this reason that the refinery agreed to accept the reading from the Southern Gas Board meter, which, as a positive displacement type, is not prone to a variable error when the volume offtake is low. When the volume increased to about 65,000 cu.ft. per hour, the theoretical overall error reduced to 2%, and it is known from experience that in practice the average error is actually mush less than this. The basis for sale was then changed to the Esso measured volume. We feel that our confidence was justified because the average difference between the Esso and the Southampton readings from February to August 1958 was well below 1%. It cannot be assumed that the positive displacement meter is 100% accurate, and a difference of 1% is not unacceptable. In fact the overall difference in quantity readings has been under .25%.

GAS ON THE CONTINENT

Burning excess gas in dual-fuel boiler

STEELWORKS are often faced with the problem of disposing of excess blast-furnace or coke-oven gas which, owing to its low calorific value cannot be economically stored. In such cases it is usually economic to burn this gas in a dual-fuel boiler, thus reducing the consumption of more expensive fuel. Clearly if this boiler is of the size normally used in industry, it will require to be automatically controlled.

The basic purpose of the coke plant is to provide process gas and coke. It is essential to ensure that gas is supplied to the boiler, only when it is in excess of requirements of the process plants. To this end, it is normal to provide an excess flow regulator in the form of a throttle valve, the position of the throttle being used to give a signal to the coal or oil controller. In some cases a mixture controller may be used to control the mixture of the blast-furnace gas and coke-oven gas, to produce a constant calorific value for the furnace. Both electric and hydraulic means have been used to control these valves.

As with any automatic boiler, control of the combustion : air ratio is also necessary. This can be effected by a load impulse controlling the air or alternatively the gas, the other component being arranged to follow automatically. Of the two methods, it is safer to control the air since, on failure of the air blowers, the gas supply will then be cut off with less explosion risks. It is not always desirable to maintain the air : gas ratio exactly constant because, for example, of the varying calorific value of the gas.

Summarising, a typical steelworks gas-fired boiler may be said to require:

1. A gas pressure regulator to keep the gas supply pressure constant.
2. A load regulator of the proportional controller type acting on the steam pressure.
3. A combustion regulator of the reset controller type acting on the forced draught fan blades or as a throttle.
4. A combustion chamber controller also of the reset type using the furnace depression to control the induced draught fan blades.
5. A boiler level control, normally a three-term controller.
6. A superheat controller, also a three-term controller, acting on sprays or mixing valves.

Clearly, many variations are possible and each design must be considered in detail. C. Fröhlich, *Gaswarme*, 79, **8**, 1959.

INSPIRED BY OUR FEBRUARY 10 EDITORIAL A GAS BOARD ACCOUNTANT SLINGS HIS SHOT AT THE ADS. GOLIATHS

DIG THIS, MR. THERM—says F. TESKEY-KING

MR. R. J. GREGG'S script 'The Voice of Mr. Therm' (published in the December issue of *Gas Service*) is a very lucid and well-reasoned appreciation of the situation so far as the placing and impact of advertisements is concerned. It is good to know that there are some in our industry who are able to grapple with such techniques as motivation research. Mr. Gregg's closing words are: 'But before a plan is evolved, there must be discussion, among all of us,' and it is because of this invitation that I would express my views on a subject far removed from my own department.

Put briefly, my view is that Mr. Therm's voice is too often heard as a quivering tremolo. Sometimes it bursts forth in ponderous diapason tones, but very rarely indeed is it a true *vox humana*, giving its message in an attractive human way. It is not sufficient to advertise goods or services *per se;* the reader must be told why he needs the goods. The faults in our publicity lie chiefly in the contents of the advertisements—they are not sufficiently appealing by modern standards, and in order to make my criticism constructive I offer suggestions for a campaign on space heating.

Sacred sitting rooms

I have read many times a book called *Heaven Lies About Us*, which is a fragment of autobiography by Howard Spring. Writing of his childhood home, the author mentions that the 'front room' was a sacred place. 'A room of our own,' he states, 'would have suited me and my brother splendidly. But the whole family, including us, still crowded into the kitchen for all purposes. It was a cheerful room if you had nothing to do but read and talk. Not so good, though, if you had any other sort of work to do. But using another room would mean laying fires . . . The consequence is the creation of the "sacred" feeling where the parlour is concerned. Even in the summer time one kept out of it.'

Times have changed. Parlours have now become sitting-rooms or lounges, but in the majority of houses the sacredness remains, still as a consequence of the fact that using the sitting-room means laying and cleaning out fires. Howard Spring's words paint the background of this campaign, the main purposes of which are (a) to make the householder aware that he has a second living-room which is not being used to full advantage, and (b) to suggest that a gas fire is the ideal means to heat this room.

Judging from the usual advertisements placed by the gas industry, one feels that the attitude is 'This will cost so much per inch, so let's make the most of it,' and the space is crammed with words and pictures and figures. I feel that at least 50% of our advertisements should make use of modern display and techniques. I would suggest wording such as:

> You prepare meals in your kitchen.
> You take baths in your bathroom.
> You sleep in your bedroom.
>
> BUT do you sit in your sitting-room?
>
> If not, why not? You pay rates on it and you put your best furniture in it.
> Why not make use of it?
>
> A modern gas fire will enable you to spend your evenings in comfortable relaxation, etc., etc.

The text of this should be reprinted as an octavo leaflet—printed in black on cheap coloured paper, with no pictures—and sent out with gas bills. Such a leaflet compels attention much more than would a glossy sheet; it has a sense of urgency about it, like a Stop Press column.

This, and similar advertisements, must be supported by displays and/or publicity material in gas showrooms. At the same time I suggest that evening surveys be made, in selected districts, by noting the addresses of houses in which lights are seen at the front. Salesmen should then follow up in the daytime with a view to selling gas fires. I feel that this approach to persons already using their sitting-rooms to some degree should result in a higher proportion of sales than would a blind canvass.

At this stage we should acknowledge that general advertising in the Press does not by any means achieve the results that advertising managers would have us believe. So far, we have made only a frontal attack, and it is now necessary to make concentrated thrusts on individual formations by inserting our propaganda in specialised publications. This is nothing new, but I suggest that not enough attention has been paid to slanting the advertisement towards the particular specialist chosen. There are, for example, dentists' journals:

> Your patients are not usually overjoyed to visit you, but a glowing gas fire will at least make their wait as comfortable as possible.
>
> Are you sure your waiting-room is all that it might be?
>
> The local Gas Board will be glad to advise you without any obligation.

or

We know that you do NOT have copies of *Punch* dated 1913 in your waiting-room, but is your fire as up-to-date as it might be? Modern gas fires cost less to run and have a high efficiency. Why not ask your Gas Board to advise?

By having weekly picture-strip features in the better children's publications, the Gas Council have, in my view, shown both originality and wisdom. Those in *Girl* particularly are important, for a large part of their readers will themselves be setting up home within ten years, and it is indeed wise to let them 'grow up with gas' to quote Mr. Gregg. But why neglect the possibility of selling gas to children while they are still children?

Children of today are a very powerful force in the land. Competition in schools is fierce, and never before have parents shown so much interest in education. The publishers of children's encyclopædias and educational books have never had it so good; parents participate in children's education by doing all possible to ensure that their Johnny gains the highest possible place. Is there not a target for a thrust here? Here is the opportunity for a bold advertisement in local papers, a few days after the 11-plus examination results have been announced.

Eleven-plus Examination

Congratulations to all the children who have gained places in this examination.

Congratulations, too, to the parents who offer their children the best possible facilities for study.

An instantly-adjustable gas fire is the answer to homework in the winter months. Your child deserves the best, so make enquiries today at . . . . .

I would then make use of that sadly overlooked publication, the school magazine. Most secondary school magazines have a complete sell-out, yet because the local authority imposes a restriction on the selling price they are published at a loss, and advertising revenue is welcome. Although circulations are relatively small, every issue reaches 500 homes *in each of which there is a child with homework to do.*

So I would place advertisements in secondary school magazines, making special efforts to attract the pupil. For example:

Suppose $a = 1$ and $b = 1$.

Then $a = b$

and $a^2 = ab$

$\therefore a^2 - b^2 = ab - b^2$

$\therefore (a+b)(a-b) = b(a-b)$

Divide by $(a-b)$

$\therefore a + b = b$

$\therefore 2 = 1$

There must be something wrong somewhere, but there is nothing wrong with gas for heating.

Do you do your homework in comfort, in a room kept warm by an instantly adjustable gas fire, or do you have to compete with TV or Johnny's supper?

Advice, without any obligation, may be obtained from . . . . .

Again, selecting a school where Latin is taught:

Puella Rigensis ridebat
Quem tigris in terga vehebat.
Externa profecta
Interna revecta
Et risus cum tigre manebat.

She was unfortunate, but perhaps she would never have met such a fate if she had stayed at home, doing her homework in front of a cosy gas fire, instantly adjustable, etc.

If you work in more Spartan conditions, ask your parents to get in touch with the sales manager at the gas showrooms, who will give advice without obligation.

It would be simple to devise publicity on these lines, and when it is considered that in my own city there are about 8,000 children attending grammar and secondary technical schools alone, it is clear that the target is not a small one. And, make no mistake, if the advertisements amuse or entertain the child, he will show them to his parents.

Useless posters

I can think of many other fields, but these are for the advertising expert to explore. As to cost, this can be covered easily by cutting out expensive and useless poster campaigns. Holding campaigns or not, does anybody really believe that a large poster bearing the words 'Gas Burns to Serve You,' 'Mr. Therm at your Service,' or even 'Constant Hot Water by Gas' does one ha'porth of good? Mr. Therm is a well-known character, but he must be prepared to grow up and move with the times and not become the Billy Bunter of the advertising world. To lapse into the vernacular of the present, it's time he gave up being a square and started to dig!

Welding: Eye, face and neck protection

FOLLOWING the recent publication of B.S. 679, Filters for use during welding, B.S.I. has now issued a revision of B.S. 1542. Thus two associated standards dealing with head protection against welding radiation are now brought completely up-to-date.

B.S. 1542 takes account of the new welding processes requiring greater protection than previously found necessary; and it recommends equipment for use with classified types of welding. Requirements for quality of workmanship and finish for spectacles, goggles, masks and helmets are specified; and there are tests for flammability, strength of spectacle frames, and for corrosion resistance. There is a new test for electrical resistance.

Assurance to users

The marking requirements now call for the application of B.S.I.'s certification mark—the Kite monogram. This mark is an assurance to users that all items of equipment bearing it do in fact comply with the specified requirements.

Copies of this Standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price, 5s. (Postage extra to non-subscribers.)

Gas Council chief confirms trend

HIGH PRESSURE GASIFICATION NEAR COAL AND OIL SOURCES

NEWS SUPPLEMENT

CONFIRMATION of the trend towards the use of high pressure gasification processes with large installations situated at coalfields or near oil refineries was given by Mr. W. K. Hutchison, Deputy Chairman of the Gas Council, when he addressed a meeting of the North Western branch of the Institution of Chemical Engineers recently.

On the gasification of oil, Mr. Hutchison said that at one installation it was now planned to produce the hydrogen component by partial combustion of the feedstock with oxygen under a pressure of 25 atmospheres, followed by shift reaction of carbon dioxide removal. The hydrogen would be blended with hydrocarbons and nitrogen to give a finished gas of the desired calorific value and specific gravity.

The Texaco and Shell processes were equally suitable for the production of hydrogen; the hydrocarbons could be obtained by cracking oil, as refinery gas, or by the hydrogenation process, and the nitrogen was available as a waste product from the oxygen plant.

Natural gas

The search for natural gas in the U.K. seemed unlikely to yield much result, he said in his paper, which was entitled 'Research and Development in the Gas Industry.'

Referring to the liquid methane shipment trials he said it might well be that the world reserves of natural gas were comparable with those of oil. While pipe-lining would undoubtedly be favoured wherever possible, there must be many circumstances in which the only outlet could be by sea transportation.

After dealing with the many new developments in gas production, including the Lurgi process, slagging gasifiers, and the Rochdale process, Mr. Hutchison turned to utilisation.

Insufficient attention

Until quite recently the ventilation of gas appliances to the atmosphere had followed methods established for cruder fuels and insufficient attention had been given to special methods for dealing with the combustion of gas.

The principle of the balanced flue appliance was first applied 30 years ago but only since 1954 had the system been adopted extensively. The principal disadvantage was, until recently, that it had to be fitted on an outside wall but this difficulty has been overcome through the development of the Se-Duct.

Mr. Hutchison said the present programme of the Gas Council would lead to a significant advance in the processing of fuel.

'All this will call for a greatly increased research and development effort,' he concluded.

Kidderminster works takes ducking, maintains pressure

Scene at Kidderminster works when the River Stour flooded stores yard, distribution offices and retort house.

ALTHOUGH much of the gasworks was under 18 in. to 3 ft. of water in a recent flood, production at Kidderminster (West Midlands) was maintained without loss of pressure.

A plan based on experiences in a similar emergency in 1955 was used.

Appliances and records were taken to top floors, and vehicles moved to higher ground. Sandbags and battens strengthened main entrance, retort and boiler house gates, the gaps of which were clay-sealed.

But the River Stour rose above the level of one wall, flooding stores yard, distribution offices and other sections.

Despite a third of the works being under water, producer units were protected.

On the ebb mud deposits in the works, and flooded meters and suspended coke deliveries in the area were soon dealt with by Mr. D. W. Davison, Group Engineer and Manager, and his staff.

NOT TOO OLD

A 40-YEAR-OLD road roller did emergency duty for the Scottish Gas Board during a recent cold spell by blowing steam into the water-seal of a gasholder at Blairgowrie, Perthshire, for 36 continuous hours.

When the automatic electrical defreezing equipment broke down, an S.O.S. was sent to the district road surveyor, who called out members of his staff. Within four hours they had assembled a partially-dismantled road roller and had it in position beside the gasholder, blowing steam into the water through a series of pipes improvised by the Gas Board staff.

Electrical engineers travelled overnight from Preston to repair the defreezer.

British plant ordered in fuel expansion plan for Mexico

ASHMORE, BENSON PEASE & CO. LTD. (member of the Power-Gas Group), Stockton-on-Tees, have recently received orders from Petroleos Mexicanos, through Fluor Engineering & Construction Company, for fabricated refinery equipment of a value exceeding £¼ mill.

The equipment, which is for the Minatitlan refinery, near Vera Cruz, Mexico, includes over 70 heat exchangers and two large vessels.

Welding at docks

The vessels are 12 ft. diameter and 214 ft. long. Due to transport considerations each vessel will be despatched from the company's South Works at Stockton in four sections, one vessel being finally shipped in sections, while the sections of the other will be welded on the dockside at Birkenhead prior to shipment in one piece.

The budget of the Exploitation Department of Petroleos Mexicanos has been increased to 2,000 mill. pesos (£57.14 mill. approximately), an amount which is considered to be in line with the rate of economic growth of Mexico, calculated at between 9% and 10% a year. The budget will be for increasing exploitation of reserves of gas and crude oil.

Mexico's consumption

So as to give an idea of the magnitude of the increase in Mexico's fuel consumption, the General Director of Petroleos Mexicanos, Pascual Gutierrez Roldan, has pointed out that the average annual increase in the U.S.A. was 4%, while it was 8%-9% for Mexico and 12% for Mexico City. Nevertheless, it is expected that the problem will be taken care of this year owing to the Ciudad Pemex gas supply, which will allow a saving of more than 50,000 barrels of oil a day.

Mexico's daily gas and fuel oil consumption is over 400,000 barrels.

M.P. ASKS FOR PIONEER REPORT

MR. NEIL MARTEN, Conservative M.P. for Banbury, asked the Minister of Power (Mr. Richard Wood) last week (1) whether he would give an estimate of the cost of the plant needed for liquefaction, of a ship of 30,000 tons built to incorporate the results of the Methane Pioneer trials, and of the plant needed for regasification, respectively, in connection with the use of liquid methane for the production of gas.

(2) Whether, as a result of the six voyages of the Methane Pioneer, he was now able to give an estimate of the cost per therm of heat from this source of fuel; and how this compared with the cost per therm of oil and coal.

Mr. John George, Parliamentary Secretary, Ministry of Power: No. The experiment has not been completed and my right hon. Friend has not yet received an appraisal of it.

Scotland

SOMETHING IN COMMON

THE desire of the Scottish Gas Board to work in close co-operation with the ironmongery trade was stressed by Mr. T. Clark, area Assistant Sales Manager, when he welcomed a party of about 40 members of the Edinburgh, Leith and District Ironmongers' Assistants' Association at the George Street, *Edinburgh*, showrooms of the Board recently.

'GAS JOURNAL' CALENDAR AND DIRECTORY

THE following information has been received since the 1960 edition went to press, and subscribers are invited to correct their copies. Other changes notified will be given in the first issue of the JOURNAL each month.
D131-2

Undertaking and Owner	Officials	Plant	Make	C.V.	Consumers
Colonial Gas Assoc. Ltd.— *Head Office* : 55 *Flemington Rd., N. Melbourne*	J. R. Duggan *GM*; H. V. Allchin *S*	..	..	..	..
[1]Bairnsdale, Vic.					466
Benalla, Vic.	G. R. Bassett *M*; H. V. Allchin *S*	*H*	23	500	842
Box Hill (now includes Oakleigh)	R. Bottomley *M*; H. V. Allchin *S*	*V*	1,177	500	30,730
Casino, N.S.W.	L. Martin *M*; H. V. Allchin *S*	*H*	16	546	864
Footscray, Vic.	R. C. Arnold *M*; H. V. Allchin *S*	*V*	1,187	500	29,624
Grafton, N.S.W.	M. G. Holdom *M*; H. V. Allchin *S*	*H*	28·5	546	1,381
[2]Hay, N.S.W.				546	263
Horsham, Vic.	D. J. Lloyd *M*; H. V. Allchin *S*	*H*	22·5	500	1,029
Ipswich, Q'land.	J. B. Wright *M*; H. V. Allchin *S*	*V*	110	500	4,288
[3]Maitland, N.S.W.		*H*	79·5	546	3,063
Mount Gambier, S.A.	J. Bryne *M*; C. J. Smith *S*	*H*	34·5	500	1,507
Oakleigh, Vic.	*See* Box Hill	..	..	..	..
[4]Rockhampton, Queensland		*H*	78	500	4,276
Sandgate, Q'land.	R. S. Warner *M*; H. V. Allchin *S*	*H*	60·5	500	3,820
Seymour, Vic.	R. L. Gribben *M*; H. V. Allchin *S*	*H*	14·5	500	643
Shepparton, Vic.	A. B. Goodes *M*; H. V. Allchin *S*	*H*	39	500	1,570
Singleton, N.S.W.	T. Snushall *M*; H. V. Allchin *S*	*H*	19·5	546	811
Tamworth, N.S.W.	E. E. Dahl *M*; H. V. Allchin *S*	*H*	545	546	1,598
[5]T'sville., Q'land.					
Wangaratta, Vic.	R. J. Watson *M*; H. V. Allchin *S*	*H*	34	500	1,296
[6]Warragul, Vic.		*H*	17.5	500	683
Williamstown, Vic.	Merged with Footscray	..	..	..	..
Wollongong, N.S.W.	E. J. Pye *M*; H. V. Allchin *S*	*V*	245	529	7,797
Wynnum, Q'land.	N. V. Fereday *M*; H V. Allchin *S*	*H*	44.5	500	2,998

1. *Converted to Bottled Gas Sept.*, 1959.
2. *Converted to Bottled Gas Oct.*, 1958.
3. *Transferred to Aberdare County Council, Aug.*, 1959.
4. *Transferred to Gas Supply Co. Ltd., Oct.*, 1959.
5. *Transferred to Gas Supply Co. Ltd., June*, 1959.
6. *Transferred to Gas & Fuel Corporation of Victoria, Sept.*, 1959.

D35 CAMBRIDGE DIVISION—F. A. Rhead, *Production Engineer*. PETERBOROUGH—delete F. A. Rhead, *E.*
D62 Mersey Groups—Colin Smettem, *Commercial Manager*.
D103 WEST MIDLANDS GAS BOARD—A. Gray, *Coal and Transport Manager*.
D133 KATOOMBA—S. E. Wright *M.*
Delete Sir Arthur Smout, *Part-time Member*.
ADVERTISERS DIRECTORY **page v.** Franki Compressed Pile; correct title Frankipile, Ltd. ; **page xi.** West's Piling & Construction ; correct entry as follows :—
WEST'S PILING & CONSTRUCTION CO. LTD.—Head Office and Works : Bath Road, Harmondsworth, Middlesex, T/N SKYport 5222. LONDON OFFICE : Columbia House, Aldwych, London, W.C.2, T/N Holborn 4108. WESTERN OFFICE : 42/4 Triangle West, Clifton, Bristol, 8, T/N Bristol 26906. MIDLAND OFFICE : Griffin House, Ludgate Hill, Birmingham, 3, T/N Central 1416. NORTHERN OFFICE : 103, Hulme Hall Lane, Miles Platting, Manchester 10, T/N Collyhurst 3049. SCOTTISH OFFICE : 183, West George Street, Glasgow, C.2, T/N Central 8351. AUSTRALASIA : West's Shell Piling (A/sia) Pty. Ltd., Melbourne, Sydney, Adelaide, Wellington, (N.Z.). FRANCE : Compagnie Generale de Construction de Fours, Paris. SOUTHERN AFRICA : The Roberts Construction Co. Ltd., Johannesburg. IRELAND : Farrans Ltd., Dunmurry, Belfast.

PERSONAL NOTES

GEORGE WILSON RE-ORGANISES

GEORGE WILSON GAS METERS LTD., and its subsidiary, Radiant-Heating Ltd., have reorganised their staff in order to form a unified group 'while preserving individual trading.' The new apointments, which will become effective on April 1 are as follows:—

MR. W. D. WILSON, B.E.M., Group Chairman and Managing Director.

MR. G. E. WITHERS, Group Secretary and Director.

MR. R. B. REYNOLDS, Group Sales and Commercial Director. Mr. Reynolds, who has been responsible for setting up the group sales force, has for the past two years been responsible for the re-organisation of the parent company's production unit on the Bede Estate in Jarrow and general matters of administration. These will continue to require his time for the immediate future.

MR. W. COMPTON CARR, M.P., Group Director.

MISS F. M. MEARING, Administrative Director of Radiant-Heating Ltd.

MR. S. G. HODGES, Marketing Director of Radiant-Heating Ltd. Mr. Hodges, under the Group Sales and Commercial Director, will continue responsibility for Radiant-Heating Ltd. sales in the areas of the Eastern, South Eastern, Southern, South Western, and North Thames Gas Boards.

MR. J. WILSON, Group Development Engineer. Mr. Wilson, who joined the company in March, was previously the industrial engineer of the Rochdale/Littleborough/Heywood districts of the North Western Gas Board.

MR. A. J. VERNON, Northern Group Sales Supervisor, covering the North Western, North Eastern, Northern and Scottish Gas Boards areas. In addition, Mr. Vernon will be responsible for Radiant-Heating Ltd. sales in the areas of the East Midlands, West Midlands and Wales Gas Boards.

MR. I. PREECE, Group Sales Representative in the areas of the East and West Midlands Gas Boards and the southern area of the Wales Gas Board.

MR. J. A. BREEZE, Group Sales Representative in the areas of the Eastern and North Thames Gas Boards for Radiant-Heating Ltd.

MR. J. D. JACKSON, Group Sales Representative in the areas of the Northern and Scottish Gas Boards. Mr. Jackson joined the company in January from the Glasgow Division of the Scottish Gas Board where he was senior representative in the commercial section.

MR. A. M. HAKEN, Group Sales Representative in the areas of the South Western, Southern and South Eastern Gas Boards (excluding meter orders in the latter Gas Board). Mr. Haken also joined the company in January from Southend, where he held the appointment of special services representative, H.Q. Division, North Thames Gas Board.

MR. C. P. WALTER will continue to call on the North Thames, Eastern and South Eastern Gas Boards on behalf of George Wilson Gas Meters Ltd.

MR. L. SWAN has been appointed Jarrow Factory Manager and MR. N. KINSTON will continue to be responsible for the Gas Meter Division, while MR. J. OWEN, who has recently joined the company, has been appointed Group Buyer.

MR. ROBERT J. MANT, formerly deputy divisional manager of Electrolux Ltd.'s London division, has been appointed to the General Sales Manager's staff at the company's head office, 153-5, Regent Street, London, W.1. His successor as Deputy Divisional manager is MR. RONALD D. LEWIS, who was formerly an area manager in the London division.

Mr. Mant

Mr. Mant, who is aged 47, joined Electrolux Ltd. in 1950 as an area manager, ond was promoted deputy divisional manager in 1954. He began his career in 1927 in the electricity department of Ilford Borough Council and was later appointed as a showroom assistant. In 1934 he joined the South Metropolitan Electric Light and Power Company as showroom manager, to which position he returned after war service in the Royal Navy. Mr. Lewis joined Electrolux Ltd. in 1953 as a contracts area manager with its Scottish division and afterwards transferred to the company's eastern division. On leaving school Mr. Lewis joined the Royal Air Force and served throughout the war as a night fighter pilot. He began his business career, after the war, as an administrative assistant with the British Petroleum Co. Ltd in Britain and in Palestine and then became a sales representative with Ofrex Ltd. and later with J. & E. Atkinson Ltd.

Mr. Lewis

MR. BARRIE HEATH, D.F.C., Managing Director of Powell Duffryn Carbon Products Ltd. and a Director of other companies in the Powell Duffryn group, has relinquished his Powell Duffryn appointments. Following Mr. Heath's resignation MR. R. TURNER, Acting Managing Director of Powell Duffryn Technical Services Ltd., has joined the Board of Powell Duffryn Carbon Products Ltd. as Deputy Chairman, and MR. F. W. STOKES, a Director and the present Works Manager of the company's factory at Hayes, has been appointed General Manager.

MR. G. H. THOMAS, Manager of the Dyffryn Rhondda colliery, has been appointed an H.M. Inspector of Mines and Quarries. Mr. Thomas is well known in the gas industry, particularly in the Wales Gas Board area, and is closely concerned with the supply of methane from the Afan Valley mines to the South Wales Gas grid.

FORTHCOMING EVENTS

March 1-12.—'GAS AT WORK IN INDUSTRY': Exhibition at the Royal Horticultural Hall, London, S.W.1, sponsored by the Eastern, North Thames, South Eastern and Southern Gas Boards.

March 11.—COKE OVEN MANAGERS' ASSOCIATION, SOUTHERN SECTION: Park Hotel, Park Place, Cardiff. 'The Coal Seams of South Wales,' by H. F. Adams, N.C.B. Coal Survey Laboratory, Cardiff.

March 12.—MANCHESTER JUNIORS: Lancashire Cricket Club Pavilion, Old Trafford, Manchester. Annual Dinner and Dance.

March 12.—YORKSHIRE JUNIORS: Harrogate. 'Internal Organisation' by C. Roberts, Sales and Service Officer, Wakefield.

March 15.—LONDON AND SOUTHERN SECTION, I.G.E.: Pepys House, 14, Rochester Row, Westminster, S.W.1. 'The Production of Domestic Coke,' by G. H. Fuidge, of the South Eastern Gas Board.

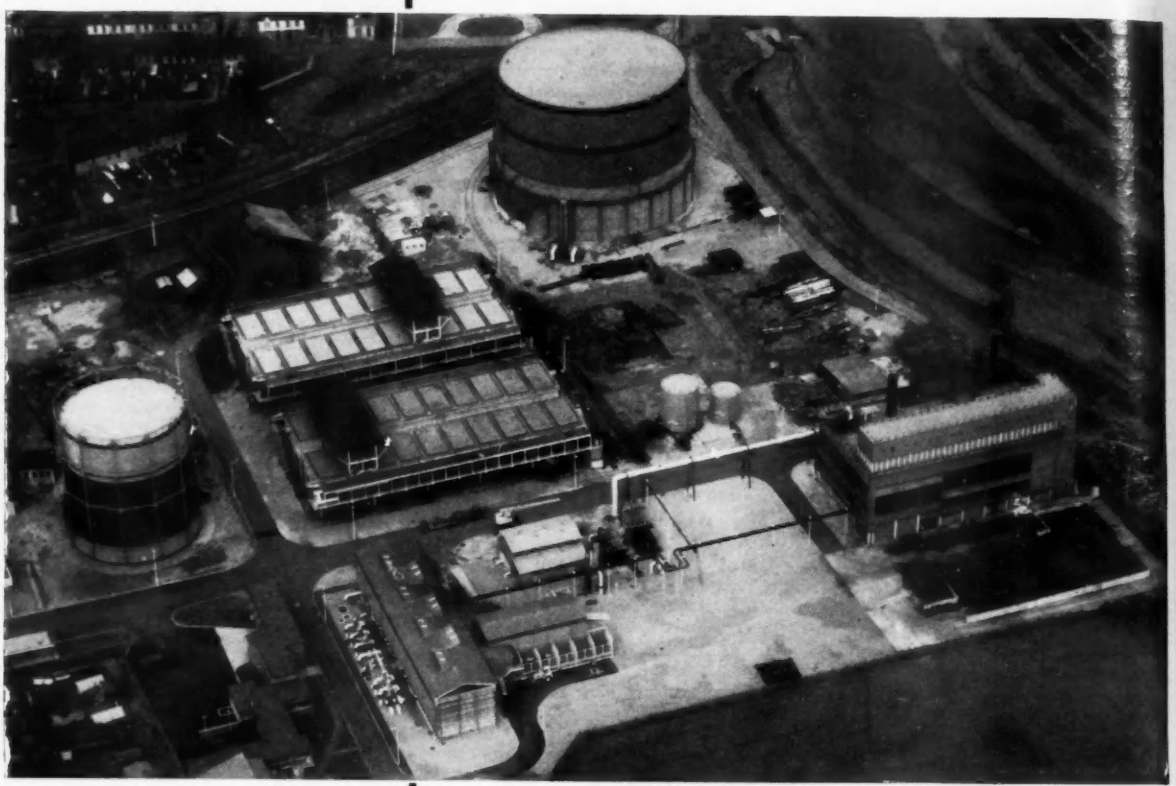
March 16.—THE SOCIETY OF INSTRUMENT TECHNOLOGY, CONTROL SECTION: Manson House, 26, Portland Place, London, W.1. 'The Simulation of a Large Chemical Plant on an Electronic Analogue Computer,' by A. H. Doveton and K. C. W. Pedder.

March 16.—SOUTH WESTERN SECTION, I.G.E., Exeter. 'The Use of Diesel Engines in the Gas Industry,' by A. J. Ingram, Area Diesel Engineer, South Western Gas Board. To be preceded by a visit to Exeter manufacturing station.

March 16.—EASTERN SECTION, I.G.E., Bedford. Morning visit to Bedford Gasworks. Luncheon by invitation of the Eastern Gas Board. Afternoon: Paper on 'The Bedford Oil Gas Plant,' by K. B. Meggitt.

March 16.—SOUTH WESTERN G.C.C.: Taunton. Council meeting at 11 a.m.

MODERN GASWORKS CONSTRUCTION



The reinforced concrete purifiers also the piled foundations for the compressor house etc. were designed and constructed for the Wales Gas Board at their Aberavon Works

PETER LIND & COMPANY LIMITED
LONDON